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REPORT ON
K I N N E A R
STEEL ROLLING DOOR

RECEIVED

FEB 21 1939

A. S. T. M.

Made November 7, 1938 for
BOARD OF STANDARD & APPEALS
City of New York

BY

The **UNDERWRITERS LABORATORIES Inc.**
CHICAGO, ILLINOIS

The **KINNEAR**
Manufacturing Co.
COLUMBUS, OHIO

KINNEAR has the only Rolling Steel Door, and the only Three-Hour Door, tested and labelled by New York City under the new Building Code.

Kinnear Mfg. Co., Inc.
R. C. A. Bldg.
30 Rockefeller Plaza
New York, N. Y.
Tel. Circle 7-0352



The Kinnear Manufacturing Co.

Sales Offices

*Cable Address
"Kinnear Columbus"
Codes used
A. B. C. 4th Edition
Lubbers Standard
Directory Code*

Manufacturers of the

Kinnear Steel Rolling Doors and Shutters

*Boston 6 Jersey St.
Chicago 128 North Wells St.
Cleveland 7704 Carnegie Ave.
New Orleans 529 Hibernia Bank Bldg.
Philadelphia 1321 Arch St.
Detroit 7710 Woodward Ave.
New York 30 Rockefeller Plaza
R. C. A. Building*

GENERAL OFFICES

Columbus, Ohio, U.S.A.

January 27, 1939

AN EXPLANATION OF THE UNDERWRITERS' REPORT.

This bulletin consists of excerpts of a report of a test conducted at the Underwriters' Laboratories, Inc., by their engineers for the Kinnear Manufacturing Company and in the interest of the Board of Standards and Appeals of New York City. It also includes the adoption of the recommendations of the Board's Committee on Tests to approve the use of the Kinnear steel rolling "Akbar" door in New York City, as a fire retardant.

The Committee on Tests, representing the Board of Standards and Appeals, and who were present at the test, are as follows:

Bernard A. Savage, Commissioner
Charles M. Blum, "
Patrick Walsh, Asst. Chief of Fire Dept.

For convenient reference, the following subjects are covered in this bulletin:

Object of Test
Reproduction of the Assembly Drawings
Examination and Test Record
Summary of Test
Pertinent Photographs of the Door
Time Temperature Graphs

To avoid repetition, the following subjects, given in the official report, have been omitted:

A Detailed Description of the Door
Drawings Relating to the Construction of the Door Parts
The Log of the Test (This information given under "Examination and Test Record")
Unimportant Photographs taken at Intermediate Periods

If further information on this subject is desired, it will be gladly furnished to interested parties upon request.

Very truly yours,

THE KINNEAR MANUFACTURING COMPANY

E. H. McCloud
Vice President

EHMc/B

Underwriters' Laboratories, Inc.

For Service - Not for Profit

SPONSORED BY

National Board of Fire Underwriters



207 EAST OHIO STREET, CHICAGO

Retardant 107

Application No. 38C1908A

November 17, 1938

REPORT

on

ROLLING STEEL DOORS

Kinnear Manufacturing Co.,
Columbus, Ohio

I N T R O D U C T I O N

The object of the test and investigation was to determine the fire retardant performance of a rolling steel door, designed for the protection of openings in fire walls, when subjected to the Three-Hour Fire Tests of Opening Protective Assemblies (Building Code of the City of New York, Appendix II).

The test assembly was designed for mounting on one face of a fire wall 9 ft in width and 10 ft in height.

The door assembly was inspected and labeled by the local inspector of Underwriters' Laboratories, Inc. at the factory of the submitter, Columbus, Ohio.

E X A M I N A T I O N A N D T E S T R E C O R D

INSTALLATION AND OPERATING TESTS:

DESCRIPTION OF SAMPLE

These tests involved the erection of a rolling steel door assembly constructed as previously described in a brickwork setting in a movable front wall of the testing furnace. The door assembly was designed for the protection of an opening 9 ft in width and 10 ft in height as shown on Photo 1. The door and parts were unpainted. The curtain and hood were galvanized.

METHOD

The masonry opening was constructed before the door was installed.

The door was erected by the manufacturer's representatives and under the observation of an engineer of Underwriters' Laboratories, Inc.

RESULTS

The assembly was installed as shown in Photo 1. No difficulty was experienced during the installation using tools and methods ordinarily employed by mechanics doing this type of work. The guides were secured to the brick masonry by 3/8-in. through bolts and the brackets above the lintel by 1/2-in. through bolts. After the door was installed and adjusted, the door operated satisfactorily. The fusible link in the automatic releasing mechanism was fused and the door closed the opening without rebound. The door was then reset for ordinary operation.

FIRE AND FIRE HOSE STREAM TESTS:

These tests were conducted in accordance with the requirements of Fire Tests of Opening Protective Assemblies, Building Code of the City of New York, Appendix II, and the equipment regularly used by Underwriters' Laboratories, Inc. for tests of fire doors, Appendix III, was employed.

DESCRIPTION OF SAMPLE

The test was conducted on the door assembly described under the heading "Installation and Operating Tests." The over-all portion of the door assembly exposed to the fire test was nominally 10-1/2 ft in width and 12 ft in height as shown in Sheet 1 and Photo 1. Provision for expansion was provided in the assembling of the various members as described in the descriptive section of this report.

METHOD

The equipment regularly used by Underwriters' Laboratories, Inc. for tests of fire doors, described in Appendix III, was used with additions to the apparatus for indicating temperatures at various locations on the unexposed surface of the door.

After the panel on which the door was mounted was drawn into position, the fire was started in the furnace, exposing one face of the door to gas flames controlled in accordance with the Standard Time Temperature Curve. This exposure to fire was continued for three hours, after which time the panel was withdrawn from the furnace and the exposed face was immediately subjected to the impact and cooling action of a 30-lb water stream applied for 2 min 47 sec, in accordance with the Standard Fire Test Specifications (Appendix II).

The furnace chamber temperatures were indicated by twelve calibrated thermocouples symmetrically placed as shown in chart, Fig. 10.

Temperatures on the unexposed surface of the door were indicated by three thermocouples symmetrically placed as shown in chart, Fig. 10. Each thermocouple was covered by a 6 by 6-in. dry asbestos pad, in accordance with the Standard Fire Test Specification. In addition to the above, bare thermocouples were placed on the door and 32, 64, and 96 in. away from the unexposed face, in accordance with the usual practice of Underwriters' Laboratories, Inc. for tests of fire doors (Appendix III).

Deflections of the door were determined by measurements at about center point on a horizontal line across the center of the door. The reference base was a fine steel wire, mounted on the wall frame, with one end fixed and the other free to slide so as to remain in a constant position with respect to the original location of the points at which measurements were taken.

Throughout the Fire and Fire Hose Stream Tests observations were made to note the character of the fire and its control; the condition of the exposed face as observed through mica windows provided in the end walls of the furnace, and all developments pertinent to the performance of the door as a fire retardant with special reference to stability, heat insulation, and flame passage; and the general condition of the door resulting from application of the fire hose stream.

The general appearance of the unexposed face of the panel just before the start of the test is shown on Photo 2.

RESULTS

Character of Fire - It is sometimes difficult to maintain standard furnace temperatures because of the heat loss through a large area of steel of a thickness similar to the construction employed in this test. This condition was accentuated somewhat by the general bulge of the door toward the fire and the extension of the hood into the furnace chamber, although the test assembly was set back about 8 in. in the test panel. The fire was well distributed during the test and was generally luminous during the first 60 min, becoming less luminous in the upper quarter of furnace during the remainder of the test due to the volume of gas used in order to maintain furnace temperatures. There was about 36,000 cu ft of gas used during the three-hour test on this assembly.

The average furnace temperatures are as shown in chart, Fig. 11.

Observations of the Door From the Fire Side - The automatic releasing mechanism, including the flame stop in hood, operated during the first 30 sec after the start of the test.

The bottom bar began to bulge upward off the sill at about 2 min, assuming a maximum of $3/4$ in. at about 10 min, remaining in this position until about 90 min, then gradually decreased to $1/2$ in. at about 100 min, remaining in this position until the end of the fire test.

The lower edge of the hood began to bulge downward and away from the curtain during the first 5 min of the test. This bulging increased slightly as the test progressed. The appearance of the hood after the 3-hr fire test and before the application of the water stream is shown in Photo 5.

The appearance of the exposed face of the door assembly after the fire and hose stream test is as shown by Photos 6, 7, and 8.

Observation of Door from Unexposed Face - Small quantity of smoke appeared on the unexposed surface of the door during the second minute after the start of test and continued in decreasing volume during the first 15 min of test, after which no further smoke was apparent on this face.

The cotton strip at 32 and 64 in. away from the unexposed surface of the door was smoking at about 10 min and the cotton strip at 96 in. was smoking at about 15 min and at 32 in. away was turning brown. The burlap strip ignited at about 20 min. The flames from the burlap strip at 32 in. ignited the cotton strip located at the same distance from the unexposed face of the sample. The cotton strip at 64 in. was turning brown at about 35 min, and the burlap strip at 64 in. was badly charred at 45 min and ignited at 53 min. The cotton strip at 64 in. was badly charred at about 70 min and ignited at 120 min. The withdrawal cord at about 128 in. from the door ignited at about 120 min after the start of the test.

Flickers of gas flames from the furnace chamber appeared along the lintel at about 50 min. These flames ceased at 60 min, as shown in Photo 3. No further flame appeared on this face during the test. These flames were apparently due to furnace adjustment at that time.

The pressure in the furnace chamber at about the center of the test assembly fluctuated slightly as the test progressed. A maximum minus pressure variation of 0.023 in. was noted during the first hour, 0.031 in. the second hour, and 0.034 in. during the third hour of the test. It was necessary to adjust the dampers in the top of the furnace from time to time in order to obtain satisfactory fire conditions owing to the volume of gas necessary to maintain standard temperatures in the furnace chamber.

The curtain sagged about 2 in. during the first hour, increasing to 4 in. at about 100 min, and 5-1/2 in. after the Fire and Hose Stream test. This general sag in the curtain is illustrated in Photo 7 showing the irregular shadow line down the center of the curtain. The curtain remained in position in grooves during the Fire and Fire and Hose Stream Tests.

The appearance of the unexposed face of the door after Fire and Hose Stream Test is shown by Photo 9.

Movement of the Door - During the Fire Test, movement of the door was toward the fire. The bulging was gradual, as follows:

<u>Time, Minutes</u>	<u>Deflection at Center, Inches</u>
5	5/8
10	2
15	2-1/4
20	2-7/8
30	3-3/4
45	4-5/8
50	5-1/4
60	5-1/4
70	5-1/2
80	5-3/4
90	6-1/4
100	7-1/4
110	7-1/2
120	7-1/2
135	7-3/4
150	8-1/2
165	8-1/2
175	9

Temperatures on Unexposed Face of Door -

The temperatures indicated by the bare couple placed in contact with the unexposed surface and the temperatures at 32, 64, and 96 in. away from the unexposed face of the door are shown in chart, Fig. 11.

The average temperatures indicated by three thermocouples placed under asbestos pads in contact with the unexposed surfaces of the curtain were as follows:

<u>Time, Minutes</u>	<u>Temperatures, Degrees Fahrenheit, Average</u>
5	662
10	1108
15	1216
20	1353
25	1406
30	1473
35	1510
40	1526
45	1530

(Table continued on next page)

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<u>Time, Minutes</u>	<u>Temperatures, Degrees Fahrenheit, Average</u>
50	1683
55	1728
60	1710
* 65	1708 (top and bottom couples)
** 75	1705 (bottom couple only)
85	1750 " " "
95	1755 " " "
105	1745 " " "
115	1805

* Center couple fell from position.

** Top couple appears to have slipped from position.

The bottom couple fell at about 115 min.
The dislodgment of the surface couples was due to
the general bulge of the curtain toward the fire.

Observations Before, During, and After
Fire and Hose Stream Test - The general appearance of
the exposed face of the door assembly before the
water was applied is shown in Photo 5, and the appear-
ance of the exposed and unexposed faces of the door
after the impact and cooling of the hose stream is
shown in Photos 6, 7, 8, and 9. The deflection of
the barrel after the removal of the hood is shown in
Photo 8.

LOG OF TEST:

Complete log of test is given in
Appendix I.

S U M M A R Y O F F I R E A N D F I R E H O S E
S T R E A M T E S T S

Inasmuch as this test was conducted in the presence of members of the Board of Standards and Appeals of the City of New York to determine whether or not the door assembly complies with the provisions of Fire Tests of Opening Protective Assemblies, Building Code of the City of New York (Appendix II), no conclusions regarding such compliance or noncompliance have been drawn by Underwriters' Laboratories, Inc.

No passage of flame through the door or smoke in significant amount occurred during the three hours of fire exposure. Hot gas and flashes of flame from the furnace chamber appeared along the lintel during the 50 to 60-min period.

During the fire exposure there was a uniform bulge at the center of the curtain towards the fire, assuming a maximum of 9 in. at about 175 min after the start of test. This bulge was reduced somewhat after the impact and cooling effect of the water stream for 2 min 47 sec. The curtain remained in the guides during and after the fire and hose stream test. There was maximum sagging or settling of the curtain of about 4 in. during the fire test, increasing to about 5-1/2 in. after the application of the water stream as shown in Photo 7.

Heat transmission from the fire to the protected area was liberal in amount and intensity during fire test as may be expected of a steel flame barrier assembled as described in this report.

Taking into account the observed expansion of parts, warping of the curtain, deflection of the barrel, it is judged essential that the parts comprising the construction of these doors be provided with ample provisions for expansion as in the test installation herein reported.

R107

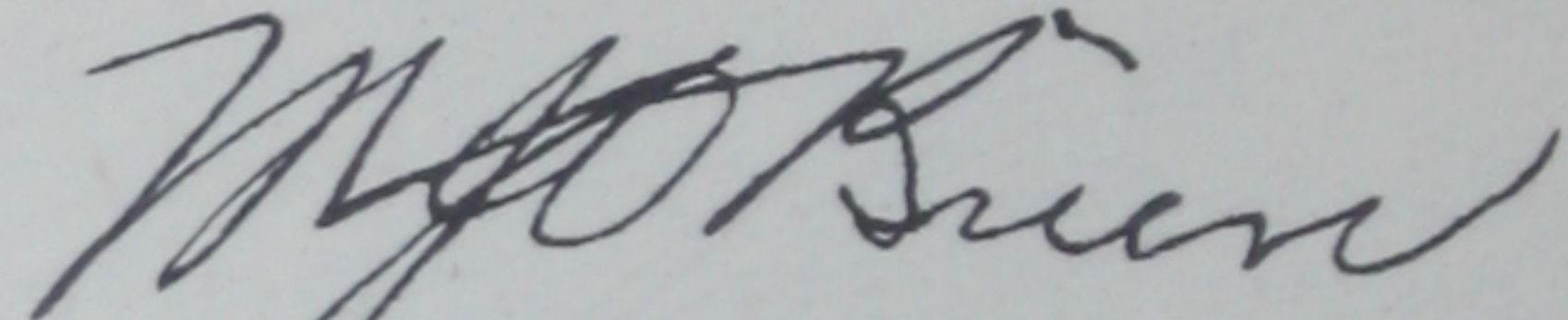
Considering the amount of observed warping in the bottom bar during the early stages of the test, it is considered necessary that the provision for expansion be so arranged that each member comprising the bottom bar be free to expand in either direction in case of exposure to severe fire conditions.

Tests by:

Respectfully submitted,

M.J.O'Brien
A.J.Steiner
T.T.Wilhelmy

UNDERWRITERS' LABORATORIES, INC.

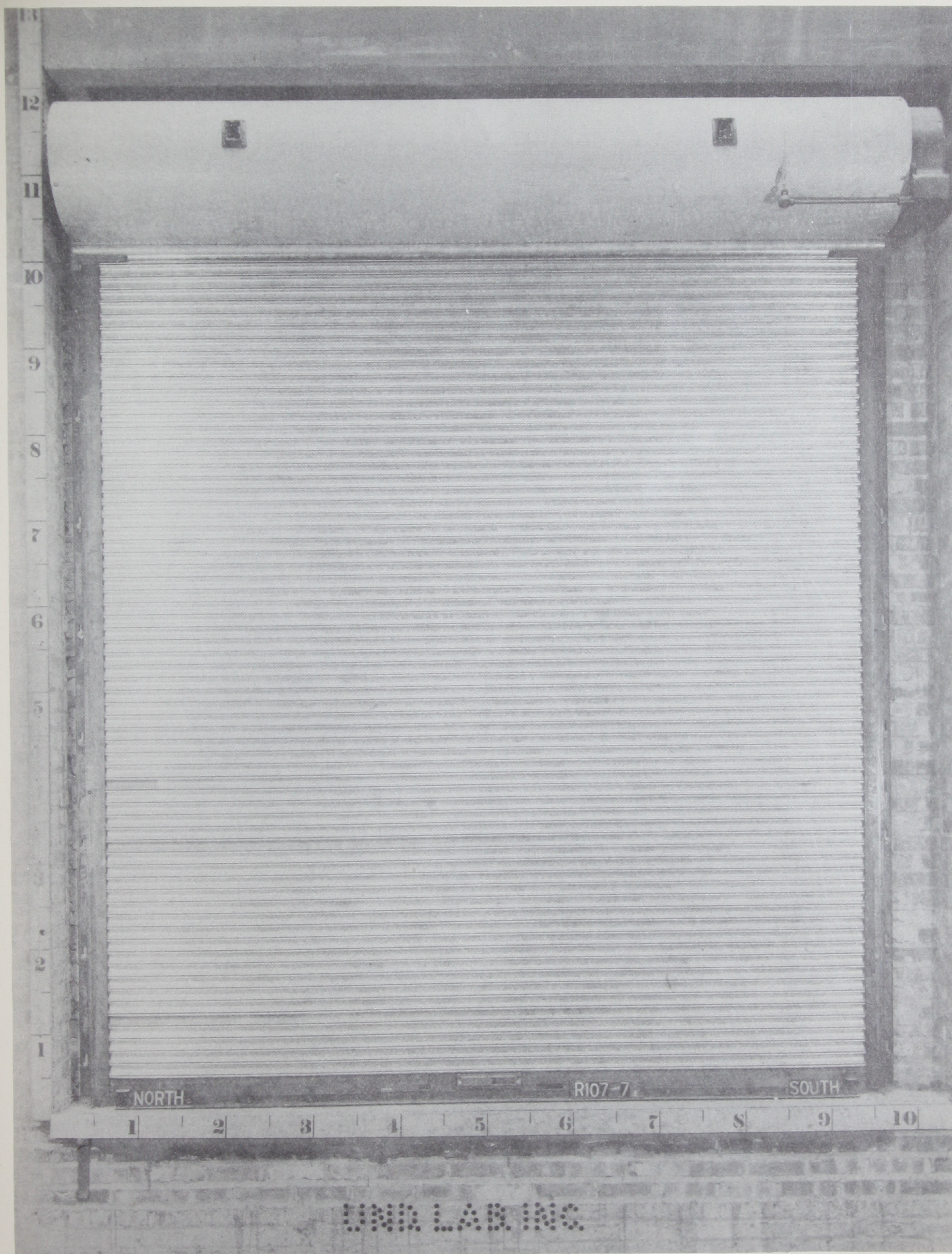


M. J. O'BRIEN
Assistant Engineer,
Protection Department

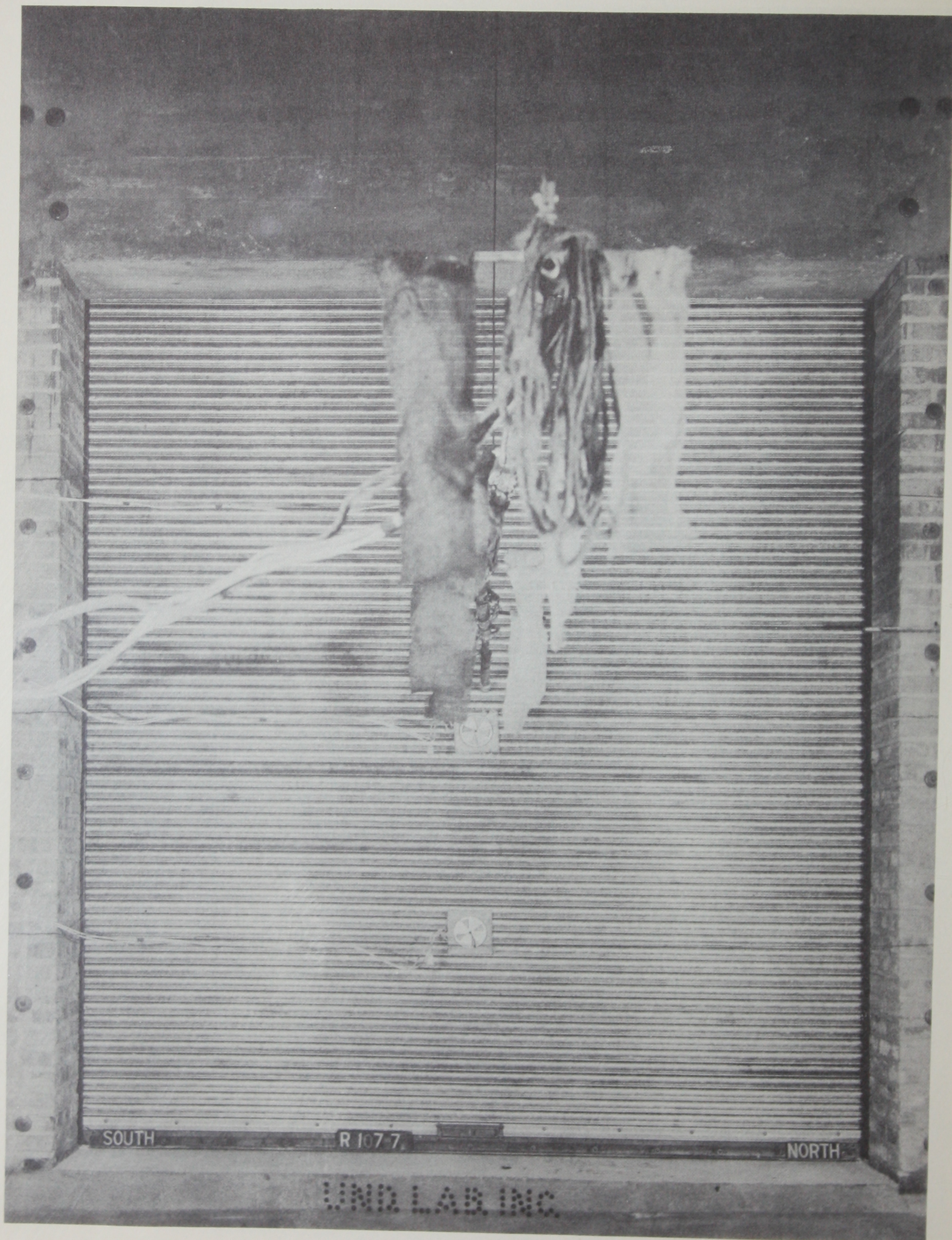
Commissioners, Board of Standards and Appeals:

Bernard A. Savage
Charles M. Blum
Patrick Walsh

MJO'B:FMJ



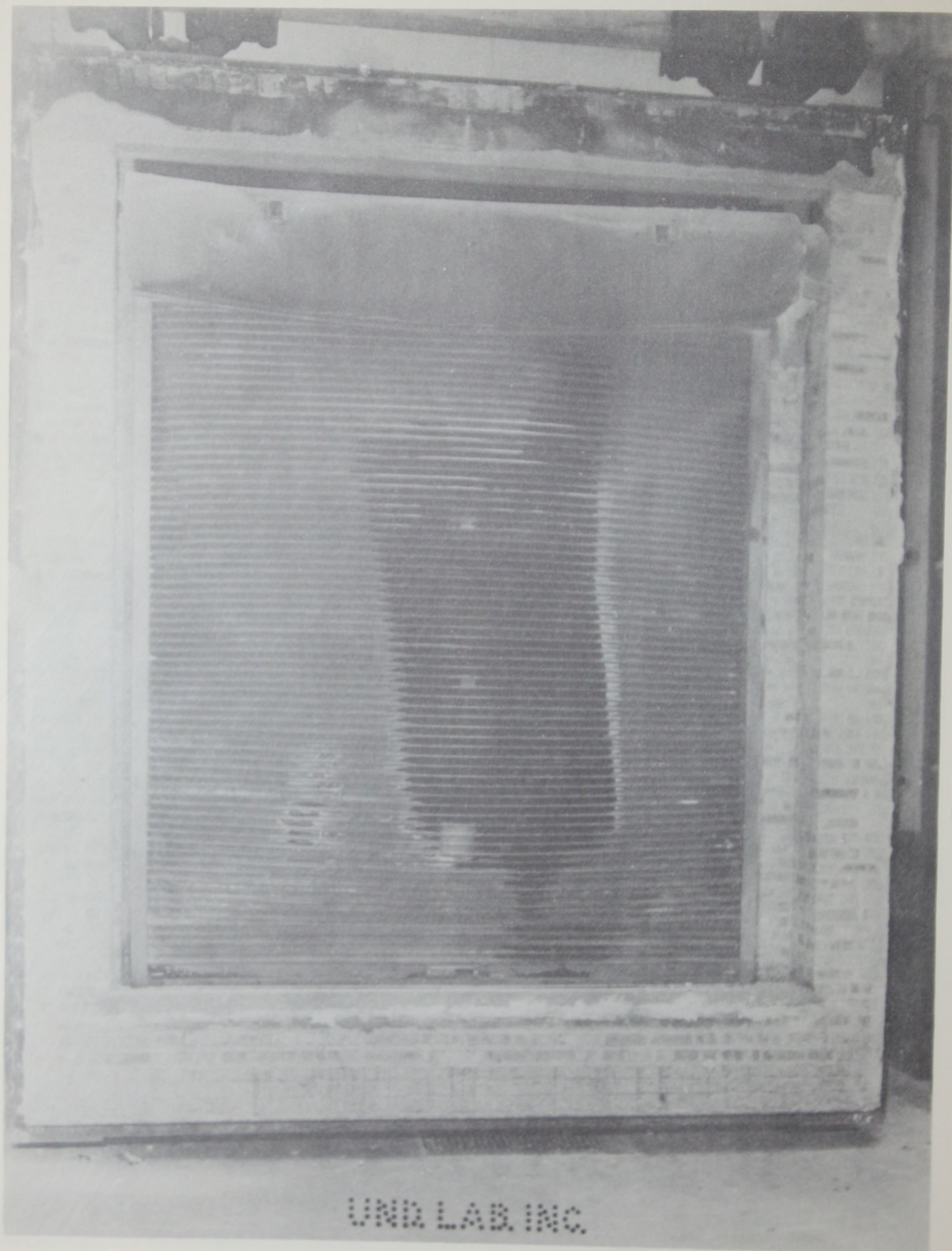
Exposed Face Showing Doors Closed Before Test.



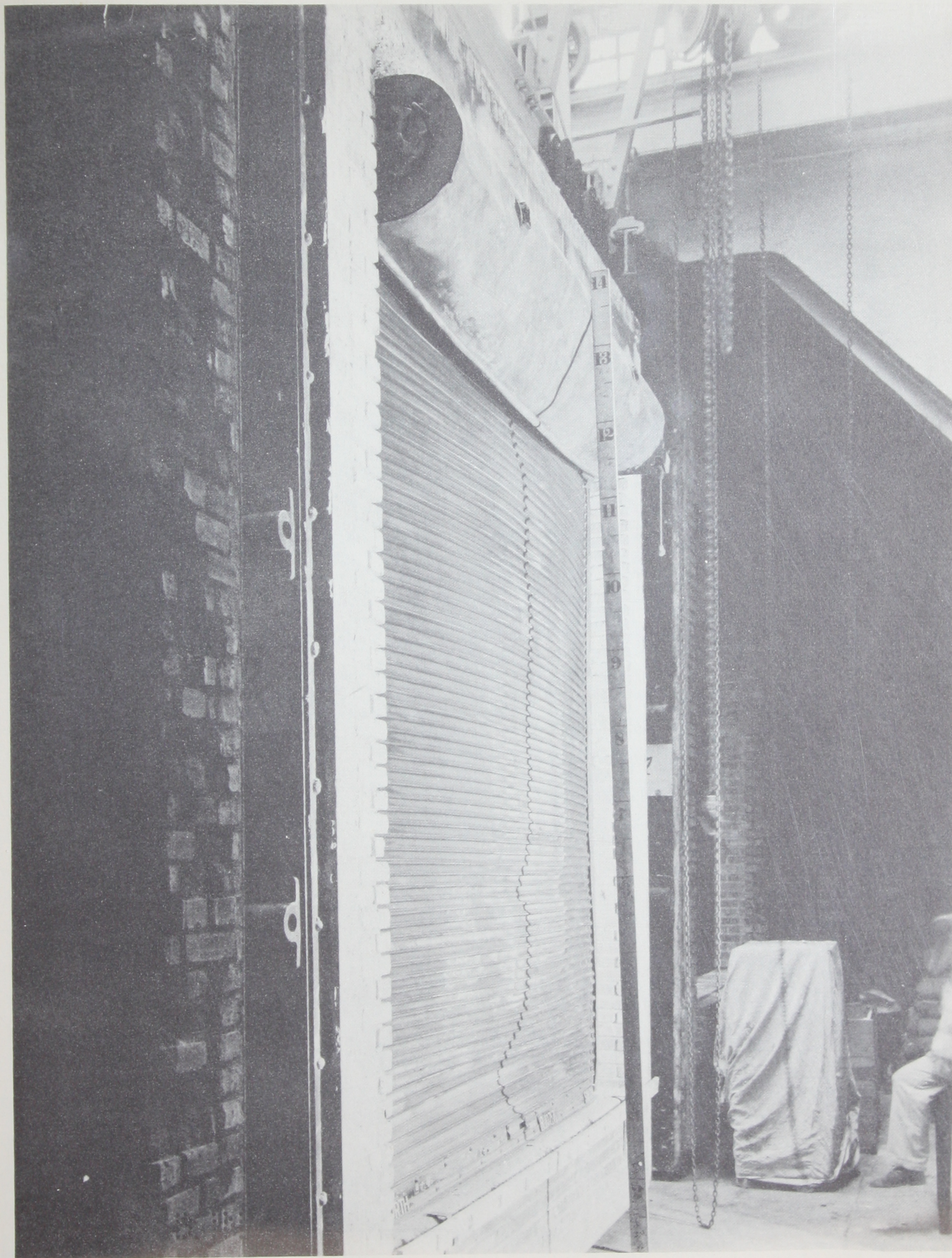
Unexposed Face Before Test Showing Temperature
Equipment In Position.



Unexposed Face Of Sample 120 Min. After
Start Of Test.



Exposed Face Of Sample After Three-hour Fire Test
and Before The Application Of The Hose Stream.



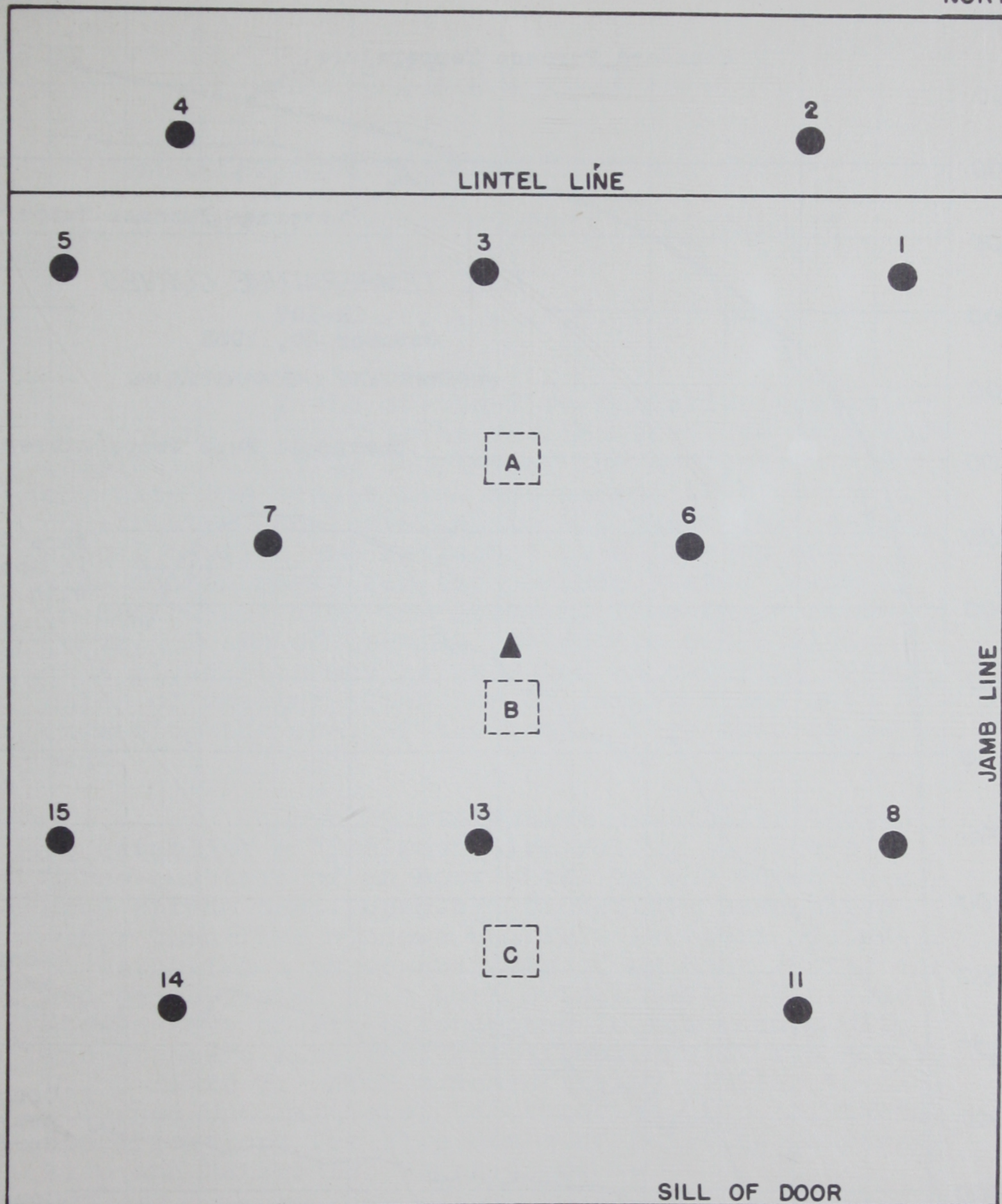
Side View of the Exposed Face After The Fire and Hose Stream Test Showing The Sag Of The Curtain.



Unexposed Face of Sample After the Fire and
Hose Stream Test.

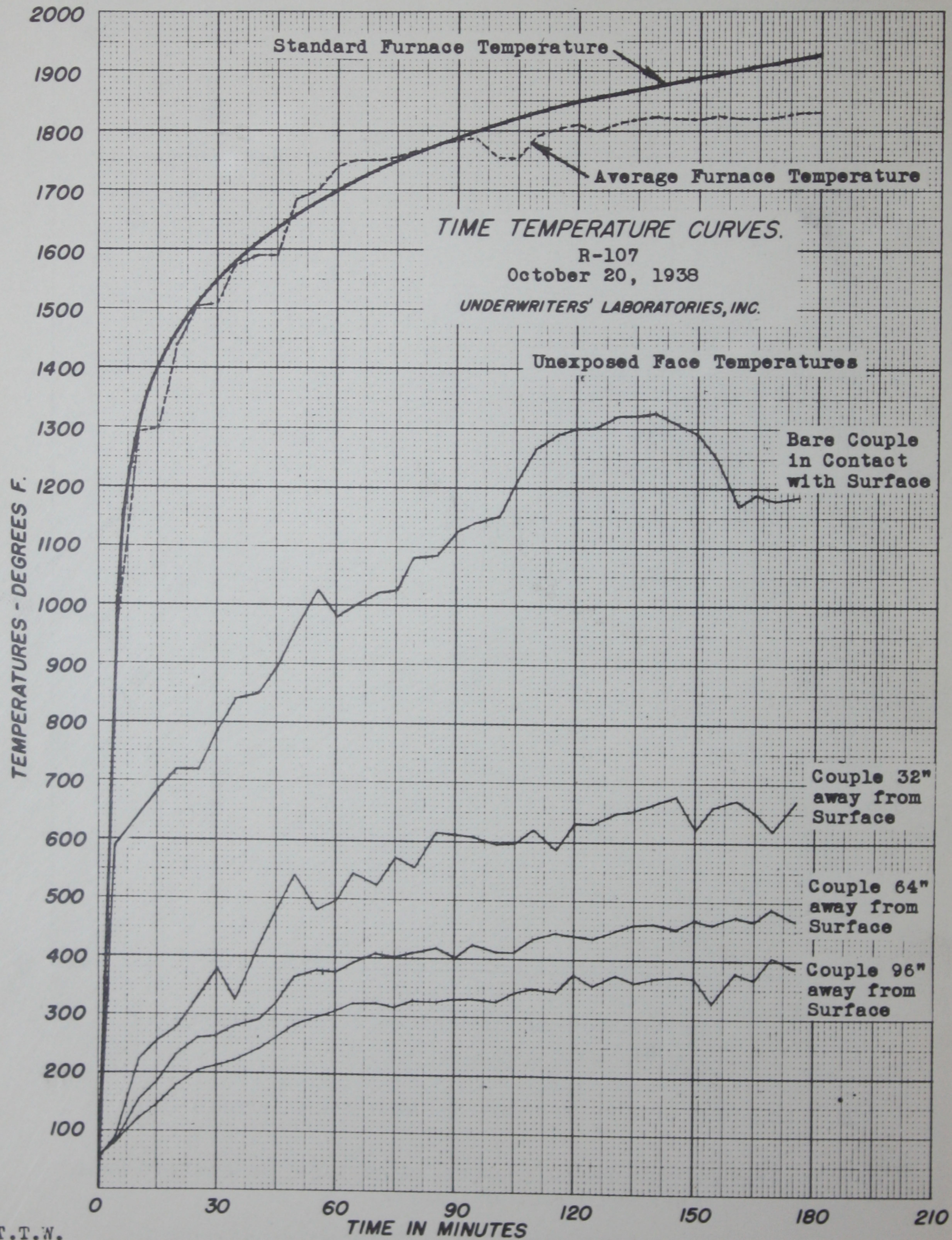
SOUTH

NORTH



DISTRIBUTION OF COUPLES OVER TEST ASSEMBLY

- LOCATION OF FIRE COUPLES (6" AWAY FROM EXPOSED FACE)
- LOCATION OF SURFACE COUPLES UNDER PADS (IN CONTACT WITH UNEXPOSED FACE OF SAMPLE)
- ▲ LOCATION OF BARE COUPLE IN CONTACT WITH UNEXPOSED FACE OF SAMPLE



A P P E N D I X II

BUILDING CODE OF THE CITY OF NEW YORK

FIRE TESTS OF OPENING PROTECTIVE ASSEMBLIES
(10.1.18)

.

Tests of the fire resistive qualities of opening protective assemblies shall be made upon complete full size samples of the device, but in any case the sample need not exceed 12 by 9 feet, constructed and installed in all essentials as in actual service and subjected to a fire on one side continuously for the periods stated below in accordance with the Standard Time-Temperature Curve. Tests of opening protective assemblies of a given size may be accepted as covering assemblies of smaller sizes, or of larger sizes not exceeding the area of the sample more than 25 per cent.

Opening protective assemblies tested to establish a fire resistive rating in excess of three-quarters of an hour shall be subjected to a hose stream test. Opening protective assemblies other than fire windows and fire shutters tested to establish a three-quarters of an hour rating need not be subjected to a hose stream test. The hose stream test shall be conducted in accordance with the standard fire test specifications of the A.S.T.M., D., C 19-26 T, which are essentially similar to the attached Underwriters' Laboratories, Inc.'s Standard Specifications for Fire Tests of Building Construction and Materials, pages 4 and 5.

The duration of the fire test shall be for:

Door Assemblies for Fire walls	3 hours
Fire partitions. . .	1-1/2 hours
Fireproof partitions . . .	3/4 hour
Fire Window and Fire Shutter assemblies . . .	3/4 hour

When two protective door assemblies, both previously accepted as entitled to a one and one-half hour fire resistive rating, are installed on two sides of the same opening, such combined assembly shall be accepted as having a three-hour fire resistive rating.

Tests of protective door assemblies shall be considered unsuccessful unless the assemblies prevent the passage of smoke or flames in considerable volume under neutral furnace pressure at the mid-point of the door, and withstand the pressure of the hose stream when required. Tests on all protective door assemblies to be used in required fireproof partitions and in corridors used as means of egress as required by Article 6, Means of Egress, and Article 12, Special Occupancy Structures, shall be considered unsuccessful when the average rise in temperature measured at the middle of the unexposed surface of the assembly and at the mid-points of the upper and lower half of the assembly exceeds 650 degrees Fahrenheit in three-quarters of an hour, but no such temperature readings shall be taken directly over glass panels.

Tests of fire windows and fire shutters to be successful shall meet the requirements for doors as to structural strength and passage of flame, but no restriction shall be made as to the amount of heat transmitted through the windows or shutters; furthermore small portions of glass dislodged by application of the stream of water shall not be considered as structural weakness.

CITY OF NEW YORK

BOARD OF STANDARDS AND APPEALS

MUNICIPAL BUILDING
BOROUGH OF MANHATTAN

MATERIALS SUBMITTED FOR APPROVAL

792-38-SM.

APPLICANT—Kinnear Mfg. Co., Inc., owner.

SUBJECT—Approval of Kinnear Steel Rolling Door, Akbar Type, manufactured by Kinnear Mfg. Co., Inc.

APPEARANCES—

For Applicant: None.

ACTION OF BOARD—Material approved in accordance with report of the Committee on Tests.

THE VOTE TO APPROVE MATERIAL—

Affirmative: Chairman Murdock, Commissioners Savage and Blum and Assistant Chief Walsh

4

Negative

0

Absent

0

THE RESOLUTION—

(792-38-SM)

WHEREAS, the Kinnear Mfg. Co. of New York City, owner, filed September 14, 1938, an application with the Board of Standards and Appeals from approval of the material known as the Kinnear Steel Rolling Door, Akbar Type, under the provisions of Section C.26-610.0 Administrative Code (10.1.18 B.C.) and C.26-660.0 Administrative Code (10.8.1 B.C.); and

WHEREAS, this material was submitted to the Committee on Tests of the board for test and report; and

WHEREAS, the report of the Committee on Test was as follows:

REPORT OF COMMITTEE ON TESTS.

December 2, 1938

Re: Cal. No. 792-38-SM.

Subject: Kinnear Steel Rolling Door, Akbar Type.

The Kinnear Mfg. Co., Inc. of New York City filed on September 14, 1938 a request for the approval of the Kinnear Steel Rolling Door on the basis of a 3 hour requirement for the protection of openings in fire walls, as provided for in C 26-610.0 (10.1.18 B.C.) and C 26-660.0 (10.8.1 B.C.).

The details of the construction of the Kinnear Steel Rolling Door and the results of a test of the fire retardant performance of this door when subjected to a 3 hour fire test at the Underwriters' Laboratories, Chicago, Illinois, as witnessed by the undersigned, are as follows:

Details of Test Door.

The typical door, (See Figure 1), selected for the test, was the Kinnear Steel Rolling Door known as Akbar F.M.A. This door was constructed to protect a 9 ft. wide x 10 ft. high opening, in a fire wall. It consisted of a single door, with a spring counter-balanced curtain made of No. 20 U. S. Gauge hot galvanized open hearth steel, with interlocking type slats. These slats are provided with malleable iron endlocks at each alternate slat and provided with a rib baffle with each alternate slat equipped with malleable iron end clips, thus furnishing a curtain with a continuous end baffle which fills the concave portion of the slats. The curtain, as made up of these slats, extends from sill to center of spring barrel, plus one and one-half times the diameter of the barrel, and extending side-wise into the guides to a depth of $2\frac{1}{8}$ in. The top slat of the curtain is secured to the four rings of the barrel by two $\frac{5}{16}$ in. bolts at each ring. The bottom of the curtain is provided with an angle on each side, $1\frac{1}{2}$ in. x $1\frac{1}{2}$ in. x $\frac{1}{8}$ in., and fastened to the curtain by means of a 4 in. x $\frac{1}{8}$ in. plate. *See recommendation of the committee as to the bottom bar and angles.

The barrel itself is a steel boiler tube .134 in. thick and $4\frac{1}{2}$ in. in diameter, with the ends closed by means of cast iron plugs through which the shafting passes. The plug at the automatic release side is extended and is provided with roller bearings in the bracket. The shaft is stationary in the opposite bracket, the barrel end revolving about this fixed shaft is equipped with ball bearings. The barrel is provided with counterbalancing helical springs. The automatic driving spring is wound to counteract the counterbalancing spring, and when released brings the door to a closed position. The barrel is equipped with 11 in. involute malleable rings clamped on with a $\frac{3}{8}$ in. bolt and keyed to the barrel with a $\frac{3}{8}$ in. round lug. The brackets are of cast iron and contain bearings for the support of the barrel and curtain coil, carry the hood housing the coil and forming a base for the automatic mechanism. Integral lips on the bracket guide the curtain into the grooves and act as a stop for the bottom bar of the curtain. Each bracket is provided with three $\frac{1}{2}$ in. holes for attachment to overhead lintel. The hood over the curtain coil is No. 24 U. S. Gauge galvanized steel and attached to the brackets and lintel. It carries an auxiliary inside hood held by a fusible link which is actuated by excessive heat, causing this inside hood to drop on the curtain coil, thus providing a baffle which prevents the passage of the hot gases over the top of the coil when the curtain is closed. The grooves which contain the curtain consist of two $2\frac{3}{4}$ in. x $2\frac{3}{4}$ in. x $\frac{3}{16}$ in. angles sheared to fit and one 2 in. x 2 in. x $\frac{3}{16}$ in. bolting angle with holes on 1 ft. $3\frac{3}{4}$ in. centers for attaching to wall. The holes through which the fastening of the guides is obtained are protected against expansion by slotting.

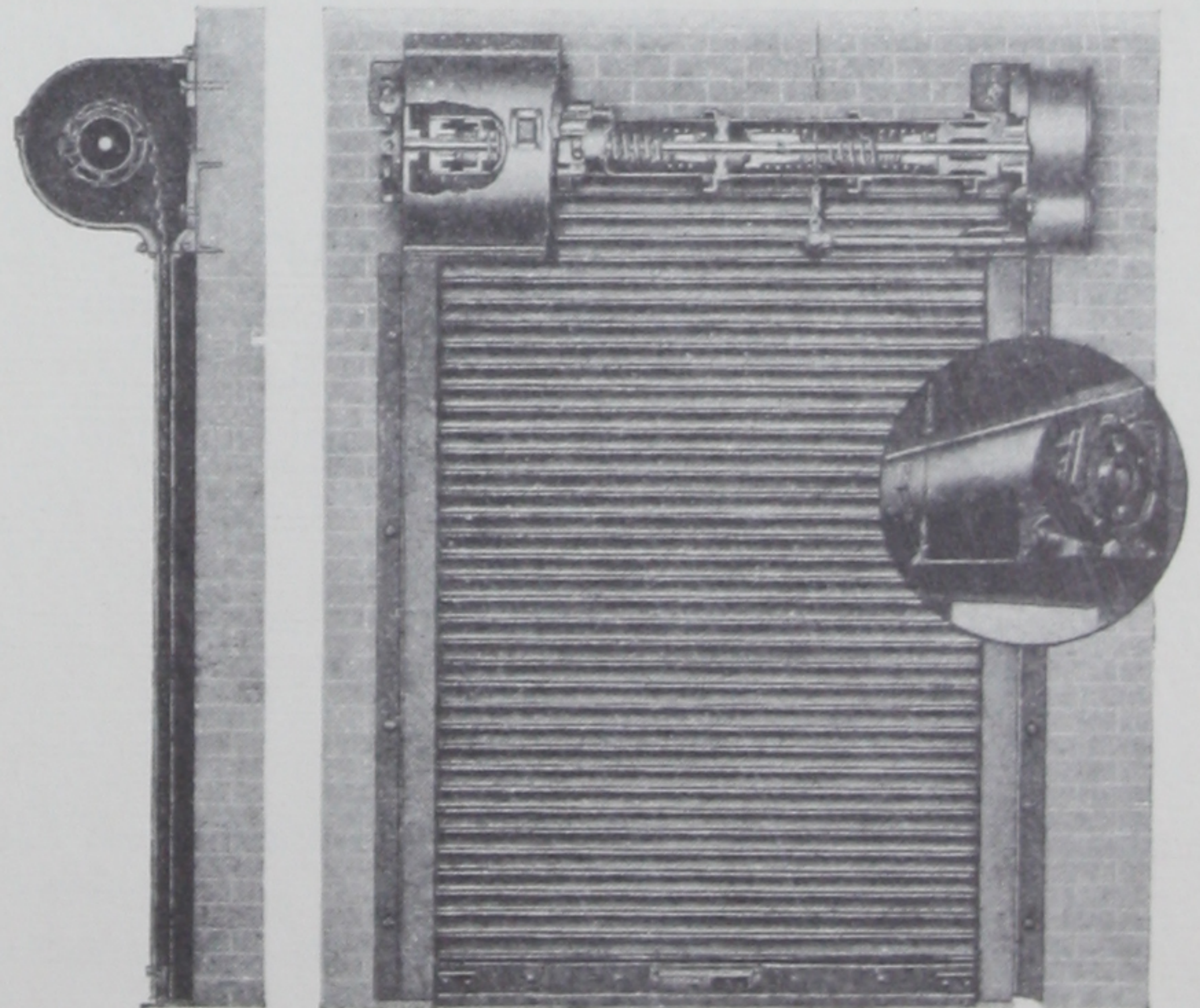


FIGURE 1

The automatic closing device consists of an adjustment wheel attached directly to a shaft holding one end of the auxiliary driving spring, an escapement wheel secured to the adjustment wheel by removable rivet pins and lugs, and a governor ring acting against the escapement wheel. The governor prevents rotation of the escapement and adjustment wheels when it

is held by the release levers, thus preventing the driving spring from acting when the adjustment wheel cannot revolve. The action of the escapement wheel and governor retards the mechanism when released, thus insuring safe operating speeds. The release levers retaining the governor ring, the automatic closing mechanism, are held in place by a fusible link. A wheel known as a traveler guide is unattached to any shaft and held against rotation by a rivet pin through a lug cast to the bracket and one of the notches on the wheel. This wheel is provided with a slot engaging a monel metal traveler which also engages in a spiral groove in the spiral wheel. A similar slot is in the escapement wheel. The spiral wheel, equipped with spiral grooves on both sides is located between the traveler guide wheel and the escapement wheel, and attached to the spring barrel by being keyed to the tubular extension of the end plug. A monel metal traveler is provided for each side with one end of the T-shaped traveler extending into the slots of the adjacent wheel and the other elongated and traveling in the spiral groove. Thus the spiral wheel turns back and forth during operation and the travelers move as constrained. Further travel downward of the spiral wheel is prevented by the travelers in the traveler guide wheel adjacent to the bracket which provides a lock, holding the barrel against further unwinding when the door is closed and uncoiling the extra curtain into the guides. The traveler actuating the escapement wheel locks the spiral wheel when the curtain is fully coiled and prevents further coiling. This brings the escapement wheel in direct contact with the spiral wheel, keyed to the spring barrel extension which, when revolved by the auxiliary driving spring, causes the curtain to be uncoiled to a closed position by action of this spring when the levers are released. Automatic closing does not affect the adjustment of the spring counterbalance, as the driving spring power is restored by pushing the door to an open position. The drawings of this door and its mechanism have been filed by the applicant, as well as a report of the Underwriters, covering the fire test conducted for the committee, as follows:

This door (Akbar type) was subjected to the Three-Hour Fire Test of opening Protective Assemblies, as specified in Article 11, Fire Resistive Construction, Sub Article 1 Fire Resistive Materials, Group 5 Fire Tests, Group 6 Fire Test Structure, Group 7 Fire Test Samples, and Group 9 Hose Stream Test, Administrative Code, to meet the requirements of C26-610.0 A.C. (10.1.18 B.C.) for fire walls three hours. This test was performed at the underwriters' laboratories, Chicago, Illinois, on October 20, 1938, and a copy of their report of this test is filed with this record.

The test assembly was designed for mounting on one face of a fire wall with an opening 9 ft. in width and 10

ft. in height. The Akbar door mounted thereon, unpainted but galvanized, was inspected and labeled by the underwriters. The fire was exposed to one face of the door for the required three hours, after which time the panel was withdrawn from the furnace and subjected to the hose stream test with the results as indicated in the underwriters' report, indicating that the door met the requirements for the three hour rating. It is significant to note that some difficulty was experienced in maintaining furnace temperatures, due slightly to a bulge in the door and to the radiant heat which emanated therefrom, but the resulting temperatures during the three hour period met the requirements of C26-580.0 A.C. Sub. c (10.1.5.2 B.C.). There was no passage of flame or smoke through the door in any significant amounts, and the door satisfactorily met the requirements of the hose stream test. There was, however, a condition of warping in the bottom bar of the door, because of the lack of provision for expansion* (See conditions of approval). The other conditions of expansion of all door parts, warping of the curtain, and deflection of the barrel, were constructed with ample provision to meet the conditions of service as may be reflected by this fire test.

On the basis of this test, the committee recommends the approval of the Kinnear Mfg. Co. door type Akbar, when manufactured in sizes permitted by the building code, as meeting the requirements of C26-610.0 A.C. (10.1.18 B.C.) and C26-660.0 A.C. (10.8.1 B.C.) as a three hour protective assembly, excepting that these doors *are not to be used* as required means of egress. Where there is combustible material within 15 ft. of the opening, two such doors are to be installed in each opening.

It is also recommended that each Akbar door be provided with a metal label with raised letters, reading as follows: (Approved by the Board of Standards and Appeals for use in New York City, under Cal. No. 792-38-SM.)

*To prevent warping of the bottom bar, it is recommended that adequate means such as slotting all holes in the bar except the center hole or shortening of the ends be provided for, so as to allow for any expansion due to fire exposure.

(Sgd.) BERNARD A. SAVAGE,
Commissioner.
CHARLES M. BLUM,
Commissioner.
PATRICK WALSH,
Assistant Chief, Fire Dept.

Resolved, that the Board of Standard and Appeals does hereby *approve* the material known as the Kinnear Steel Rolling Door, Akbar Type, when manufactured, installed and labelled in accordance with the above report.

A true copy of resolution adopted by the Board of Standards and Appeals

DEC 20 1938

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Harris H. Murdoch

Chairman
H.H.M.

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